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HESPERIA METEA LIFE HISTORY STUDIES (HESPERIIDAE)¹

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HESPERIA METEA SCUDDER RANGES WIDELY over the eastern half

of the United States. There is clinal graduation from typical *H. metea* found in the New England states to the much darker and larger *H. metea licinus* (Edwards) of eastern Texas. Specimens from the Ozark plateau region of Missouri and Arkansas are slightly smaller than *licinus* but otherwise compare well with that population. This is a univoltine species with imagines flying in any given region for a few weeks in the spring. The typical habitat in the Ozark region is found on dry, often rocky hillsides in direct proximity to woodland areas. Beard grass (*Andropogon gerardi* Vitm.), a characteristic plant of the Ozark flora, serves as the larval host. *H. metea* is one of the earliest native spring species, adults emerging with the flowering of red bud and wild plum trees. The wary males are found resting on bare patches of earth or visiting early flowers. Bird's-foot violet (*Viola pedata*) and wild strawberry (*Fragaria virginiana* var. *illinoensis*) are especially attractive. Females are not as wild and can be observed flying about the larval host plants where they settle near the base of the plants and crawl among the dried leaves and litter laying eggs. Since females fly a little later in the season they express some additional flower preferences and frequent wild larkspur (*Delphinium carolinianum*), wild hyacinth (*Camassia scilloides*), and *Verbena* species.

This species is the possessor of an interesting and unusually complicated life cycle. Females lay freely in captivity with or without the presence of *Andropogon*. During the first few instars the larvae are nocturnal in feeding habits: remaining hidden in their tents during daylight hours. In the later instars the larvae live deep within the base of the plants: actually tunneling below ground level. During the hot weather of late July, August, and early September the larvae spend long

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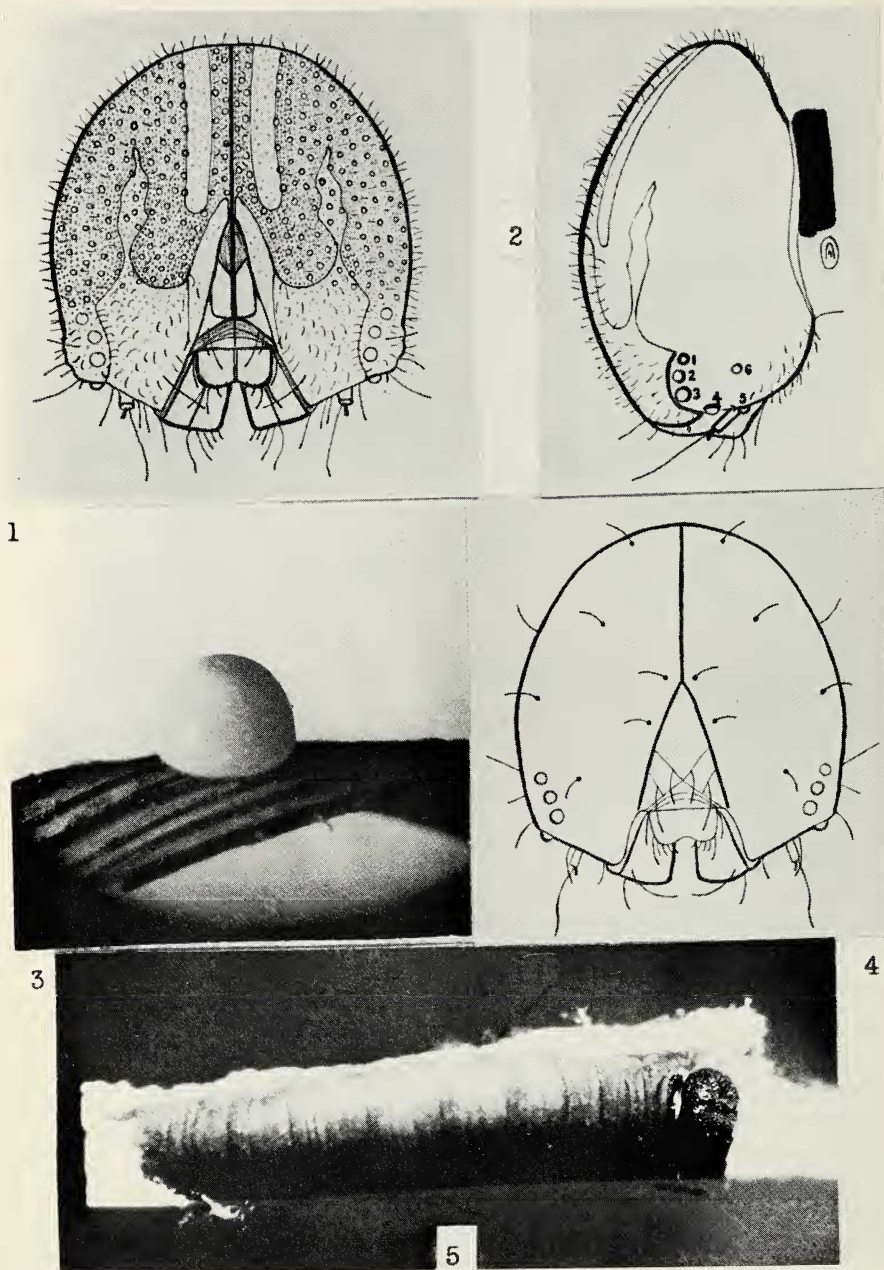


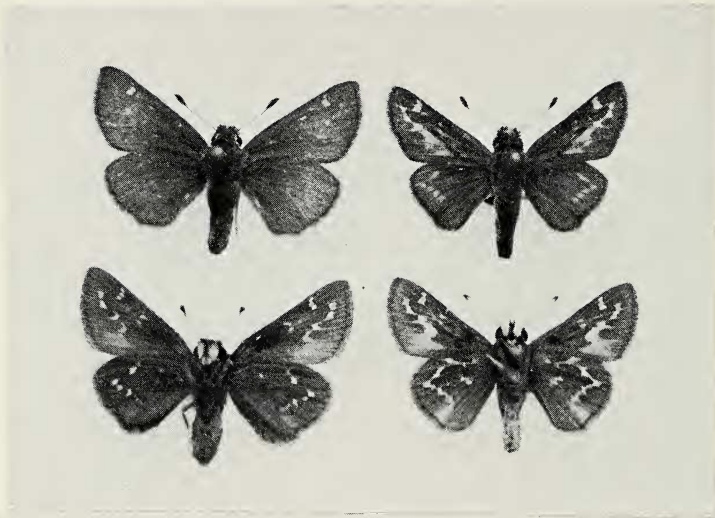
Fig. 1.—*Hesperia metea* Scudder, 1-2, Head of final instar larva, frontal and left lateral aspect. 3, Ovum. 4, Head of first instar larva, frontal aspect. 5, Mature larva.

periods in aestivation hidden deep within their tunnels. The larvae are fully developed when the first cold weather of fall arrives which provides the stimulus for hibernation. The hibernation chamber is constructed between two or more grass blades deep in the center of the grass plant. The chamber is thickly lined with silk and tightly sealed. Pupation supposedly occurs with the first warm days and rains of early spring. We have reared this pesky species from ova to hibernating larvae six different years but have yet to obtain a single pupa. We have tried numerous indoor and outdoor arrangements including enclosing entire growing plants in the garden with screen wire cages. *H. metea* does not occur in the Independence area and we have had no opportunity to attempt rearing in its native Ozark haunts. There may be edaphic problems involved since climatic conditions are essentially the same in both areas.

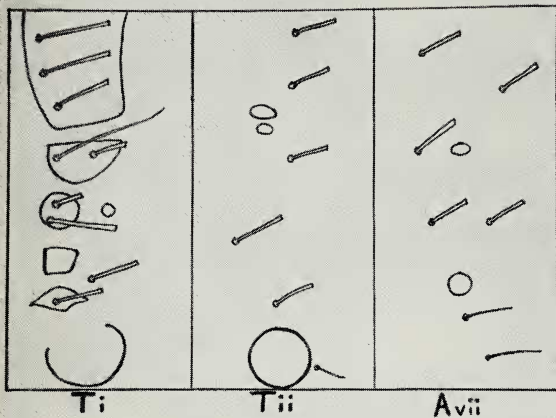
Many hours have been spent in the field during early spring looking for the "needle in the haystack." By carefully pulling apart the dried *Andropogon* clumps we have found pupae of *Atrytonopsis hianna* (Scudder), *Everes comyntas* (Godart), *Apantesis anna* Grote, and seven species of Noctuidae. At least a dozen *metea* hibernation chambers with the shriveled remains of their occupants have been found. This suggests that the natural mortality rate may be high during this dormant period. The following descriptions, minus the elusive pupa, are based upon six rearings from ova to hibernating larvae and many field observations conducted in the vicinity of Warsaw, Missouri, and Fayetteville, Arkansas. The illustrations were drawn by the junior author from specimens collected near Warsaw, Missouri during 1968 and 1969.

OVUM: Width 1.50mm, Height 1.25 mm. Creamy white, no visible markings. Eclosion in seven to eight days. Micropyle darkens on fifth day in fertile ova.

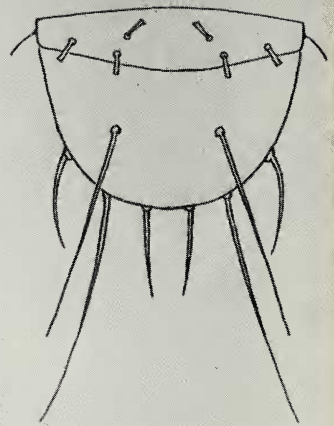
FIRST INSTAR LARVA: Head deep glossy purple, thinly covered with short pale setae. Prothoracic shield deep purplish black. Body white, unmarked, sparsely covered with white setae, some longer hairs on anal segment. The emerging larvae eat from one half to an entire egg shell. After eating the egg shell the larvae make a narrow open tent along a leaf edge a few inches from the tip. Small notches are eaten from one side of the grass blade for several inches up and down the leaf including the tent itself. After a few days of feeding the tent is enlarged and a greater amount of silk expended than for the initial structure. On the second day of feeding the body assumes a slight greenish tint. Stadium period: seven to nine days.



1



2



3

Fig. 2.—*Hesperia metea* Scudder, 1, Adults male and female, dorsal and ventral view. 2, Setae of first instar larva, prothorax, mesothorax and eighth abdominal segment, all in left lateral aspect. 3, Setae of suranal plate, dorsal aspect.

SECOND INSTAR LARVA: Head deep purplish black, granu-lose, thickly covered with short white setae. Prothoracic shield purplish black. Body pale greenish white, the three posterior segments paler. Body thinly covered with short white setae, some longer hairs curving back from anal segment. A few partial tents are constructed during this instar but in most cases the larvae hide at the base of the leaves in a fold of the leaf when not feeding. On the last day they spin a silk covering and molt within this protection. Stadium period: 19 to 21 days.

THIRD INSTAR LARVA: Head, prothoracic shield, and first pair of thoracic legs reddish purple. Head thickly covered with short pale setae, mandibles black. Two pale orange areas visible low on front of head capsule between stemmata and laterofacial suture lines. Face deeply cleft at midcranial inflection which is black with narrow orange edging. Body pale creamy gray, intersegmental folds pale yellow. Body thickly covered with minute black setae. Anal spiracles marked by a black dot. Stadium period: 10 to 12 days.

FOURTH INSTAR LARVA: Head deep reddish purple, deeply cleft at midcranial inflection which is edged with deep orange. A large orange area is present between the stemmata and laterofacial suture lines. Thoracic legs black tipped. Body creamy gray with tiny pale orange setae, intersegmental folds pale orange yellow. First thoracic and two anal spiracles marked by black dots. Prothoracic shield black. Stadium period: 10 to 12 days.

FIFTH INSTAR LARVA: Head deep reddish purple, granu-lose, covered with short orange setae, mandibles and stemmata black. Midcranial inflection edged by narrow orange lines, frons pale cream color. A small orange spot is located on each side between the stemmata and the laterofacial suture lines. Prothorax white, conspicuous. Prothoracic shield shiny black. First thoracic and anal spiracles marked with a large black dot, a tiny black dot at other spiracles. Body grayish orange, abdominal area paler, thickly covered dorsally with minute orange setae, a few longer hairs on anal segment, intersegmental folds paler. First two pair of thoracic legs deep purple, last pair pale brown. Integument opaque with a leathery texture. Larvae in this instar feed voraciously for about a week after which they become restless and leave the host plant. After wandering about for a day they begin spinning thinly lined silken tubes one to two inches in length in the center of the host plants near ground level. Very little is eaten for the next three weeks, only a few notches here and there over the plants. Every few days the larvae move to new spots and start a new tube. The larvae are

extremely nervous during this period. Even approaching the plants causes them to move uneasily and may have been the cause of frequent moves to new quarters. This aestivation period is apparently brought on by the dry midsummer weather. The size of the larvae during the last two weeks of this instar remains nearly constant. Larvae being reared outside were spurred to prepare for and enter the sixth instar after summer showers had fallen. Larvae being reared indoors were stimulated by repeated soakings of rainwater. Since the rainfall was the apparent factor governing the stadium period of this and the next (sixth) instar the duration time varied greatly: from 19 to 31 days in the fifth instar to a maximum of 51 days in one instance in the sixth instar. After the moisture stimulus a period of several days of heavy eating would begin followed by rapid molting and ingress into the next stadium period.

SIXTH INSTAR LARVA: Head deep brownish purple, granulo-se, mandibles deeper purple. Midcranial inflection bordered with bright orange lines. There is a duller orange area between the stemmata and laterofacial suture lines with a small extension rising vertically opposite the midcranial inflection. A small orange raised area is located directly posterior to the stemmata. Prothorax shiny white, prothoracic shield jet black. Body an unusual pinkish gray best described as grayish flesh, abdomen and prolegs pale flesh color, anal segment paler dorsally, almost translucent. First pair of thoracic legs black, posterior pair pale brown. Integument semi-transparent, dark areas inside body showing as blurred undulating spots. Heart line visible as a dark, pulsing middorsal line. Intersegmental folds dark pink, smooth in appearance. Small white setae visible over the body, more noticeable on anal segment. Aestivation occurs off and on during the sixth instar with the larvae retiring to their silken lined tubes deep within the base of the host plants. Sometimes several days elapse without any noticeable evidence that they have emerged. At other times the larvae become restless and wander about over the plants eating small notches here and there. The larvae require three days preparation before molting. Stadium period varies greatly and is seemingly dependent upon the arrival and amount of moisture received.

SEVENTH (FINAL) INSTAR LARVA: Length of mature larvae is 31 to 34 mm. Body grayish brown with slight lavender overcast, abdomen and prolegs slightly paler. Integument slightly translucent with a wrinkled appearance between intersegmental folds. Prothorax white, prothoracic shield and thoracic legs jet black. Spiracles marked by black dots. Head dark purple with orange lines paralleling midcranial inflection.

Orange lines parallel laterofacial suture lines and enter a paler cream colored area between the stemmata and laterofacial sutures, this pale area with an uneven vertical extension. A protruding orange area is located just posterior to the stemmata of which three is largest, two and four about equal in size, one and six equal and five the smallest. Stemmata positioned as in sketch of head capsule. Extent and intensity of head markings is variable with different specimens tending to become obscure near end of final instar. The illustrations of the head capsule markings are from specimens that have just entered the final instar when they are sharp and clear. The larvae are lethargic during the final instar. When disturbed they will curl into a tight ball and feign death, remaining thus for long periods of time, as long as 35 minutes by actual count. They feed leisurely during the day in the open, retiring to their silk lined tubes when not feeding. The final tube tent is constructed in the center of the plants, extending two or three inches into the base of the plant. The final instar larvae have two fluffy white areas of waxlike flakes beneath the posterior segments of the abdomen. In other cases where we have observed these wax flake patches on larvae the pupae were subsequently found coated with them (perhaps an excess moisture repellent since in at least one case, *Euphyes dion* Edwards, the pupae are occasionally submerged under water for lengthy periods). Stadium period quite variable, hibernation being stimulated by cool weather which occurs in late September in the Ozark region during normal years.

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